AD-A195 610 USING DYNA-METRIC TO COMPUTE BASE LEVEL SELF-SUFFICIENCY SPARES REQUIREMENTS(U) AIR FORCE LOGISTICS COMMAND WRIGHT-PATTERSON AFB OH 1/1

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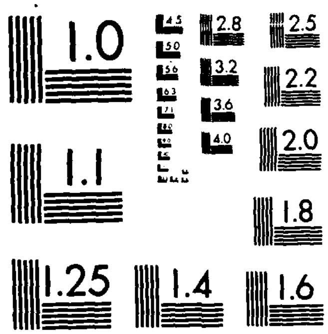

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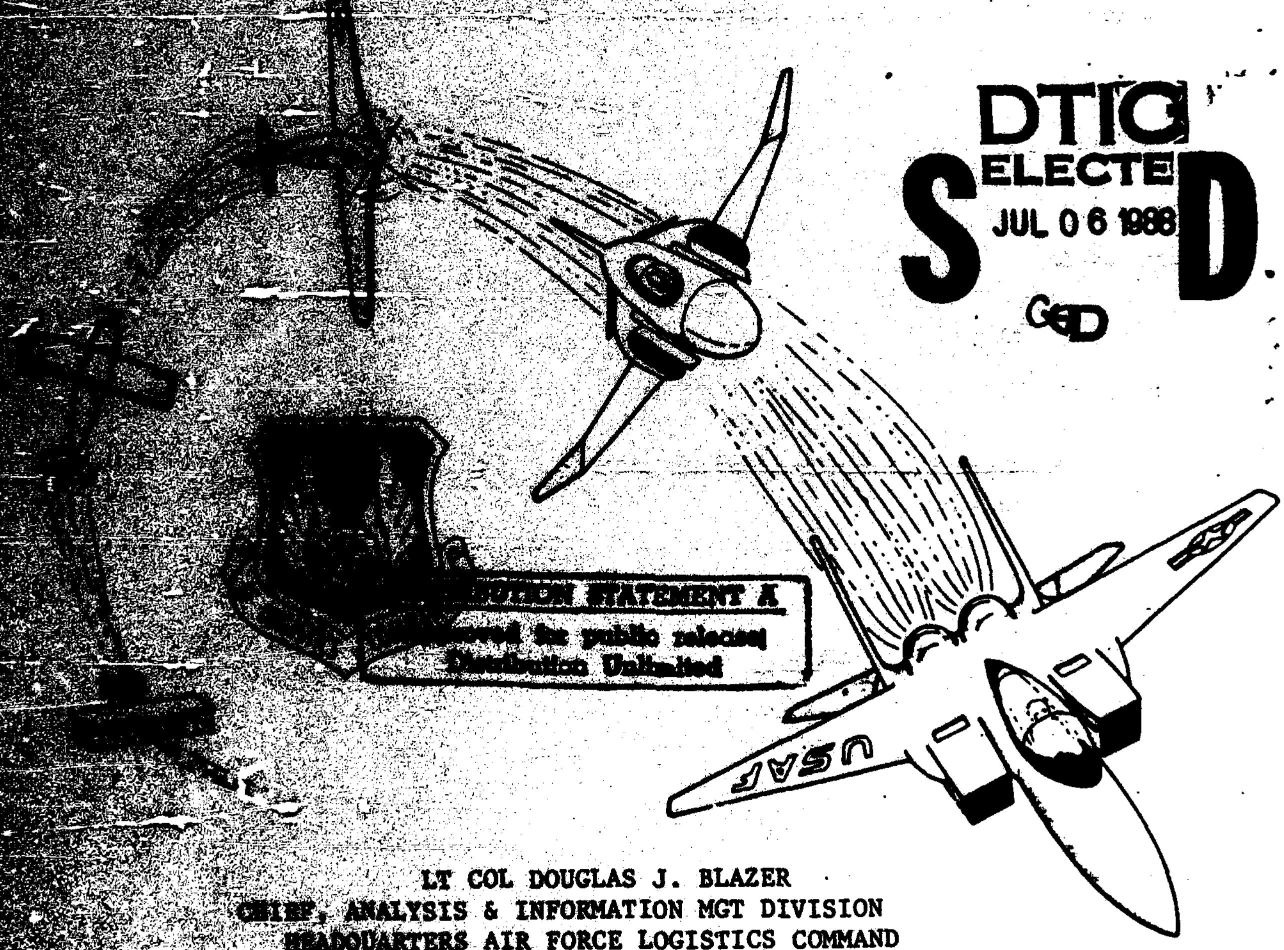
MATERIEL ANALYSIS

USING DYNA-METRIC TO COMPUTE
BASE LEVEL SELF-SUFFICIENCY SPARES REQUIREMENTS



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ABSTRACT

In this study, we compare the current system's method to compute Base-Level Self-Sufficiency Spares (BLSS) requirements to the modified Dynamic Multi-Echelon Technique for Recoverable Inventory Control (Dyna-METRIC) computation. Our analysis of several BLSS kits shows that modified Dyna-METRIC generally computes kits that meet a weapon system performance goal at a lower overall kit cost. In our analysis, requirements cost reductions per kit ranged from \$.45 to \$51.28 million. The report describes both models and recommends the Air Force use Dyna-METRIC to compute BLSS.

This document compares

EXECUTIVE SUMMARY

~~We compare~~ the current system's method to compute Base-Level Self-Sufficiency Spares (BLSS) requirements to the modified Dynamic Multi-Echelon Technique for Recoverable Inventory Control (Dyna-METRIC) computation. The current system computes a fixed safety level requirement. It is not scientific; it does not maximize weapon system performance nor even minimize back orders or costs. In addition, the current system does not consider indenture relationships. As a result, the current system stocks unnecessary items, too many of some items, and too few of other items.

Shown are

Dyna-METRIC reduces BLSS requirements cost by $.45 to $51.28 million, while meeting the weapon system support objective. Dyna-METRIC reduces the range and depth of the BLSS without reducing its combat capability. In addition using Dyna-METRIC to compute BLSS means the Air Force will use the same method to both compute and assess wartime requirements. ~~We show~~ Dyna-METRIC computed BLSS requirements to achieve a confidence level of 95 percent results in support at least equal to the current BLSS at less cost.

~~We recommend~~ the Air Force should use Dyna-METRIC (with a 95 percent confidence level) to compute BLSS requirements. The Weapon System Management Information System (WSMIS) Requirement Execution Availability Logistics Module (REALM) currently uses Dyna-METRIC to compute War Readiness Spares Kit (WRSK) requirements, so AFLC has the capability to begin using Dyna-METRIC immediately. The 47th Air Force Supply Executive Board approved the use of Dyna-METRIC to compute BLSS. AFLC will begin using Dyna-METRIC to compute BLSS requirements in May 1988.

Keywords: Air Force Logistics Command; confidence levels; materiel (KR).

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CHAPTER 1

THE PROBLEM

PROBLEM STATEMENT

In an earlier report [1], we showed the Dynamic Multi-Echelon Technique for Recoverable Inventory Control (Dyna-METRIC) model computes leaner, cheaper remove, repair, and replace (RRR) War Readiness Spares Kits (WRSK). In a subsequent report [2], we described how a modified Dyna-METRIC model computes even leaner RRR WRSK because it finds the minimum cost mix of line replaceable units (LRU) and shop replaceable units (SRU) to stock to meet the weapon system support target. As a result, the Air Force now uses Dyna-METRIC to compute WRSK, and are planning to implement the modified Dyna-METRIC model in May 1988. However, the Air Force uses a fixed safety level method to compute Base-Level Self-Sufficiency Spares (BLSS) requirements. We want to see if Dyna-METRIC will compute leaner, cheaper BLSS requirements. In this study, we compare the current system's fixed safety level method to compute BLSS to Dyna-METRIC.

OBJECTIVES: Our objectives are to:

1. Compare the requirements costs, back orders and aircraft supportability of modified Dyna-METRIC to the current BLSS war requirements methodology.

2. Recommend improvements to the Air Force's war requirements computation.

BACKGROUND:

As shown in [1], Dyna-METRIC computes leaner, cheaper RRR WRSK. We showed Dyna-METRIC reduces RRR WRSK cost by $7 to $15 million. As a result of our earlier report, the Air Force approved and now uses Dyna-METRIC to compute WRSK. Dyna-METRIC provides better or equal combat support at less cost, because it:

1. Accurately considers indenture relationships,

2. Uses exponential repair cycle times, which provides a more realistic estimate of repair capabilities, and

3. Computes requirements using a better performance measure.

Dyna-METRIC computes requirements to minimize the cost of providing an 80 percent probability of meeting the direct support objective. Thus Dyna-METRIC computes requirements to meet a weapon system support objective. Besides the 80 percent confidence level, Dyna-METRIC also is constrained to compute enough stock to satisfy the average demand during the pipeline (the time it takes to provide a serviceable asset either via repair or replenishment).

In [2], we described a modified Dyna-METRIC model which finds the least cost mix of line replaceable units (LRU) and shop replaceable units (SRU) that satisfy the direct support objective. The modified Dyna-METRIC model reduces RRR WRSK by an additional $.76 to $3.45 million compared to the (unmodified) Dyna-METRIC model. In this report then, we compare the modified Dyna-METRIC model to compute BLSS requirements that stock at least the average pipeline and provide 80 percent confidence of meeting the direct support objective to the current system's method of computing BLSS requirements. We also compute BLSS requirements for confidence levels higher than 80 percent and present those results in this report.

CHAPTER 2

ANALYSIS

OVERVIEW

We document our analysis in three sections. In the first section, we describe the current system. In the second section, we compare Dyna-METRIC to the current fixed safety level method to compute BLSS. In the third section, we discuss implementation.

CURRENT SYSTEM DESCRIPTION

In this section, we describe the current method to compute BLSS. We do not describe Dyna-METRIC. For those interested in more details on Dyna-METRIC see [1, 2, 3].

The current system to compute BLSS levels is simple; the computed level is the pipeline quantity plus the square root of the pipeline quantity.

$$\text{BLSS level} = \text{Pipeline quantity} + \sqrt{\text{Pipeline quantity}}$$

where

$$\text{Pipeline quantity} = \text{PBR (RCT) DDR} + \text{(1-PBR) (DDR) (NCT + O\&ST)}$$

and

PBR = percent of base repair
RCT = repair cycle time (the time it takes to return an item to a serviceable condition)
DDR = daily demand rate
NCT = not repair this station (NRTS condemned time is the time it takes to remove an item and determine it cannot be repaired at base level), and
O&ST = order and ship time.

Since BLSS Kits are to support wartime units that fight in place, all BLSS use a Remove, Repair and Replace (RRR) maintenance concept. Thus for those items with a base level repair capability, the pipeline is the amount of time to repair the item. For those items without base level repair capability, the pipeline is the 30-day war support period.

The daily demand rate is stated as a function of the wartime flying hour program, hence the daily demand rate varies over the 30-day period. The pipeline quantity then is dependent on the day of the war. For BlSS levels, the pipeline quantity computed is for the maximum quantity in the pipeline for the 30-day period. So for base repaired items, the maximum pipeline is usually in the first seven days of the wartime scenario, when the flying hour program is the most demanding.

There are several weaknesses of the current BLSS computational method. First, it is not scientific; it does not optimize support. Current BLSS levels are not computed to maximize combat capability or even minimize backorders or cost. The current BLSS computation provides an equal level of support for all items regardless of its indenture relationship or cost. Secondly, current BLSS levels do not consider indenture relationships at all. A BLSS level for an LRU may provide all the support necessary to meet the direct support objective; however, the current BlSS computation may also unnecessarily stock that LRU's component items. Another reason the current system may overstock items is that it does not consider cannibalization. Particularly for items with a high quantity per application or for large Primary Aircraft Authorized (PAA) Kits, cannibalizations provide a significant source of supply and could reduce the BLSS stockage requirements. Another weakness is the BLSS computation does not relate to the Air Force method to assess a kit's ability to support its wartime tasking. Currently the Air Force uses a fixed safety level to compute BLSS requirements and uses Dyna-METRIC to assess a unit's combat capability. The Tactical Air Command's CORONET WARRIOR exercise showed Dyna-METRIC provides an accurate assessment of a unit's war fighting capability. Where these two algorithms result in different levels, the BLSS requirement is either overstated or the Air Force is identifying the wrong item for increased management attention.

COMPARISON OF DYNA-METRIC TO THE CURRENT SYSTEM

We compared Dyna-METRIC to the current BLSS fixed safety level computational model. Table 2-1 shows a comparison for eight 1987 BLSS kits; four contingency kits and four buy kits. We show the results for computed items (non-computed items are excluded). The results reflect a Dyna-METRIC assessment, the same assessment method currently used in the Weapon System Management Information System (WSMIS) to assess a BLSS for a 30-day wartime scenario.

COMPARISON OF DYNA-METRIC
TO THE CURRENT SYSTEM TO
COMPUTE BLSS LEVELS
(80 Percent Confidence Level)
BLSS Contingency Kits

Weapon System	PAA	Method	Confidence Level	Expected Back Orders	Cost ($M)
F-16	24	Current System	.93	30	$ 13.48
0F016A0R2470		Dyna-METRIC	.80	120	$ 8.17
F-16	24	Current System	.93	30	$ 20.62
0F016C0R2470		Dyna-METRIC	.81	120	$ 10.54
A-10	24	Current System	.67	39	$ 5.20
0A010A0R2470		Dyna-METRIC	.80	110	$ 3.92
KC-135	15	Current System	.63	55	$ 7.69
KC135A0S1570		Dyna-METRIC	.80	188	$ 5.96
		BLSS Buy Kits			
F-16	24	Current System	.91	44	$ 25.73
0F016C0R248B		Dyna-METRIC	.80	205	$ 13.56
F-16	48	Current System	.98	58	$ 37.69
0F016C0D488B		Dyna-METRIC	.88	304	$ 22.79
F-111	66	Current System	1.00	72	$134.24
0F111E0D6680		Dyna-METRIC	.90	437	$ 82.40
F-15	24	Current System	.94	47	$ 35.24
0F015C0D248W		Dyna-METRIC	.80	188	$ 14.78

Table 2-1

Dyna-METRIC computes leaner, cheaper BLSS. For the BLSS kits we examined **Dyna-Metric reduces the requirements cost by $1.28 (A-10 Contingency Kit) to $51.84 (F-111 Buy Kit) million.** Although Dyna-METRIC results in more back orders, that relates to an increase of fewer than four cannibalization actions per day. As CORONET WARRIOR showed, many of those back orders will not result in grounded airplanes. The current system stocks many items that simply are not needed to meet the direct support objective.

Table 2-2 compares the range and depth of the current system to Dyna-METRIC for the eight BLSS kits shown in Table 2-1.

COMPARISON OF RANGE AND DEPTH
BLSS Contingency Kits

Weapon System	Method	Line Replaceable Units Range	Line Replaceable Units Depth	Line Replaceable Units Cost ($M)	Shop Replaceable Units Range	Shop Replaceable Units Depth	Shop Replaceable Units Cost ($M)
F-16 OF016COR2470	Current System	187	881	$11.46	150	247	$ 2.02
	Dyna-METRIC	117	645	$ 7.02	113	198	$ 1.15
F-16 OF016AOR2470	Current System	210	826	$18.59	160	261	$ 2.03
	Dyna-METRIC	109	603	$10.03	87	154	$ .51
A-10 OA010AOR2470	Current System	149	909	$ 4.74	56	169	$ .46
	Dyna-METRIC	103	695	$ 3.64	31	119	$ .28
KC-135 KC135AOS1570	Current System	221	2690	$ 7.58	17	61	$ .11
	Dyna-METRIC	206	2256	$ 5.89	15	48	$ .07

BLSS Buy Kits

Weapon System	Method	Line Replaceable Units Range	Line Replaceable Units Depth	Line Replaceable Units Cost ($M)	Shop Replaceable Units Range	Shop Replaceable Units Depth	Shop Replaceable Units Cost ($M)
F-16 OF016COR248B	Current System	332	1305	$23.71	159	256	$ 2.02
	Dyna-METRIC	154	884	$12.86	97	168	$ .70
F-16 OF016COD488B	Current System	287	1839	$34.80	182	370	$ 2.89
	Dyna-METRIC	228	1177	$21.96	59	97	$ .83
F-111 OF111EOD6680	Current System	579	5263	$113.73	206	1670	$20.51
	Dyna-METRIC	274	1990	$ 69.27	187	964	$13.13
F-15 OF015COD248W	Current System	280	990	$32.08	155	419	$ 3.16
	Dyna-METRIC	122	485	$14.20	91	173	$ .58

Table 2-2

Dyna-METRIC is a better way to compute kit requirements. It's scientific; it computes the minimum cost mix of spares to meet the targeted weapon system support goal. It considers indenture relationships and doesn't stock unnecessary items. Table 2-3 breaks out differences in stock levels between the models for the first F-16 BLSS kit shown in Table 2-1 and 2-2.

F-16 BLSS COMPARISON OF LEVELS

Number of Units Difference	Current System Greater Than Dyna-METRIC	Current System Less Than Dyna-METRIC
1	126	33
2	60	8
3-4	22	3
5 or more	4	0
Totals	212	44

Table 2-3

The current system stocks 337 line items for which Dyna-METRIC computed the same levels for 81, increased the requirement for 44 and decreased the requirement for 212. There are two reasons for the four items the current system stocked five or more units than Dyna-METRIC; first the different ways the two methods consider pipeline and secondly the current system does not consider cannibalizations. Dyna-METRIC uses exponential repair times, which means repair times have a distribution around a given average. In Dyna-METRIC then, there is some probability repair will take less than the average repair time. Since some assets can be repaired before the average time, fewer assets may be needed especially for items with long repair times. Failure to consider cannibalizations as a source of supply would also unnecessarily increase stockage.

IMPLEMENTATION

In March 1988, the Air Force Logistics Command (AFLC) implemented Dyna-METRIC to compute WRSK as part of the WSMIS Requirement Execution Availability Logistics Module (REALM). Thus, the capability currently exists to use Dyna-METRIC to compute BLSS requirements. We briefed the results of this study to the Air Force Supply Executive Board (AFSEB) and they approved using Dyna-METRIC to compute BLSS requirements. AFLC will begin using Dyna-METRIC to compute BLSS in May 1988.

However, there is one implementation issue that requires further explanation. The issue is what confidence level to use to compute BLSS requirements. Note from Table 2-1, that contrary to what we found for the WRSK, the current BLSS requirements exceed the 80 percent confidence level of meeting the direct support objective. We computed Dyna-METRIC BLSS to achieve an 80 percent confidence level; the same level we use to compute WRSK requirements. Note for the high Primary Aircraft Authorized (PAA) kits, Dyna-METRIC computed BLSS levels exceed the 80 percent confidence level, which basically means the computed levels are the pipeline floor for most items. However, in general using **Dyna-METRIC to compute BLSS requirements to achieve an 80 percent confidence level will reduce the support that is provided by the current BLSS.**

We determined the 80 percent confidence level was appropriate for WRSK because 80 percent exceeded the confidence level for virtually every WRSK the previous system computed. Since the same is not true for BLSS, perhaps it is appropriate to use a higher confidence level to compute BLSS requirements. This would mean the Air Force would compute different confidence levels for BLSS than for WRSK. However, the computations are different today.

Using the 80 percent confidence level to compute BLSS reduces the requirement cost by $167.2 million (refer to Appendix A). Table 2-4 and 2-5 compare the BLSS computed to higher confidence levels for the same eight kits we showed in Table 2-1 and 2-2.

COMPARISON OF ALTERNATIVE CONFIDENCE LEVELS
TO COMPUTE BLSS LEVELS

BLSS Contingency Kits

Weapon System	PAA	Method	Confidence Level	Back Orders	Cost ($M)
F-16 0F016A0R2470	24	Current System	.93	30	$13.48
		Dyna-METRIC	.80	120	$ 8.17
			.90	105	$ 9.05
			.95	95	$ 9.95
F-16 0F016C0R2470	24	Current System	.93	30	$20.62
		Dyna-METRIC	.81	120	$10.54
			.90	107	$11.55
			.95	95	$12.61
A-10 0A010A0R2470	24	Current System	.67	39	$ 5.20
		Dyna-METRIC	.80	110	$ 3.92
			.90	93	$ 4.36
			.75	81	$ 4.75
KC-135 KC135A0S1570	15	Current System	.63	55	$ 7.69
		Dyna-METRIC	.80	188	$ 5.96
			.90	176	$ 6.47
			.95	103	$ 6.98

BLSS Buy Kits

Weapon System	PAA	Method	Confidence Level	Back Orders	Cost ($M)
F-16 0F016C0R248B	24	Current System	.91	44	$25.73
		Dyna-METRIC	.80	205	$13.56
			.90	180	$14.90
			.95	163	$16.28
F-16 0F016C0D488B	48	Current System	.98	58	$37.69
		Dyna-METRIC	.88	304	$22.79
			.95	284	$23.10
F-111 0F111E0D6680	66	Current System	1.00	72	$134.24
		Dyna-METRIC	.90	437	$ 82.40
			.95	426	$ 82.96
F-15 0F015C0D248W	24	Current System	.94	47	$35.24
		Dyna-METRIC	.80	188	$14.78
			.90	175	$15.58
			.95	161	$16.83

Table 2-4

COMPARISON OF RANGE AND DEPTH
WITH ALTERNAITVE CONFIDENCE LEVELS

BLSS Contingency Kits

Weapon System	Method	Line Replaceable Units Range	Depth	Cost ($M)	Shop Replaceable Units Range	Depth	Cost ($M)
F-16	Current System	187	881	$11.46	150	247	$ 2.02
0F016A0R2470	Dyna-METRIC .80	117	645	$ 7.02	113	198	$ 1.15
	.90	117	699	$ 7.77	123	222	$ 1.28
	.95	119	755	$ 8.44	130	247	$ 1.51
A-10	Current System	149	909	$ 4.74	56	169	$ .46
0A010A0R2470	Dyna-METRIC .80	103	695	$ 3.64	31	119	$ .28
	.90	103	763	$ 4.06	36	128	$ .30
	.95	104	819	$ 4.42	37	140	$ .33
KC-135	Current System	221	2690	$ 7.58	17	61	$ .11
KC135A0S1570	Dyna-METRIC .80	206	2256	$ 5.89	15	48	$ .07
	.90	211	2363	$ 6.40	15	49	$ .07
	.95	213	2473	$ 6.92	15	50	$ .07

BLSS Buy Kits

Weapon System	Method	Line Replaceable Units Range	Depth	Cost ($M)	Shop Replaceable Units Range	Depth	Cost ($M)
F-16	Current System	322	1305	$23.71	159	256	$ 2.02
0F016C0R248B	Dyna-METRIC .80	154	884	$12.86	97	168	$ .70
	.90	162	974	$13.77	123	216	$ 1.13
	.95	169	1048	$14.89	127	246	$ 1.40
F-16	Current System	287	1839	$34.80	182	370	$ 2.89
0F016C0D488B	Dyna-METRIC .88	228	1177	$21.96	59	97	$ .83
	.95	228	1228	$22.25	71	122	$ .83
F-111	Current System	579	5263	$113.73	206	1670	$20.51
0F111E0D6680	Dyna-METRIC .90	274	1990	$ 69.27	187	964	$13.13
	.95	274	2005	$ 69.56	187	1026	$13.40
F-15	Current System	280	990	$32.08	155	419	$ 3.16
0F015C0D248W	Dyna-METRIC .80	122	485	$14.20	91	173	$ .58
	.90	122	504	$14.49	128	274	$ 1.09
	.95	124	533	$15.01	151	348	$ 1.82

Table 2-5

If we use a 95 percent confidence level to compute BLSS, the requirements cost reduction ranges from $.45 (A-10 Contingency Kit) to $51.28 (F-111 Buy Kit) million. The Air Force-wide cost reduction for BLSS computed at the 95 percent confidence level is $143.4 million (again refer to Appendix A). **Using the higher confidence level will reduce the amount of terminations and inapplicable inventory that may result from the decrease in the requirements cost and provide support about equal to today's BLSS.** We think the Air Force should compute BLSS requirements to achieve a 95 percent confidence level. Note from Table 2-4, increasing the confidence level increases the cost; however, even at higher confidence levels Dyna-METRIC computes leaner, cheaper BLSS requirements.

The only disadvantage to using the 95 percent confidence level for computing BLSS requirements is that the Air Force will use a different confidence level for BLSS than it does for WRSK. We will conduct another analysis to revisit the decision to use an 80 percent confidence level for WRSK. We suspect the significant decrease in requirements cost for the BLSS will more than offset the increase in the requirements cost for remove and repair (RR) WRSK which would result from using higher confidence levels. Note in [1], we showed Dyna-METRIC computes leaner, cheaper requirements cost for remove, repair, and replace (RRR) WRSK even at the higher confidence levels. Regardless of whether the Air Force increases the confidence level for computing WRSK requirements, **Dyna-METRIC is the way to go. Using 80 percent confidence levels for WRSK and 95 percent confidence levels for BLSS will result in wartime requirements that provide support at least equal to today's system and at a significant reduction in requirements cost.**

CHAPTER 3

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. The current method to compute Base Level Self-Sufficiency Spares (BLSS) is not scientific; it does not maximize combat capability, nor even minimize back orders or cost. The current system does not consider indenture relationships, and it does not relate to the Air Force method to assess a BLSS's war-fighting capability.

2. Dyna-METRIC computes leaner BLSS requirements; it reduces the Air Force-wide BLSS requirements cost by $143.4 million.

3. AFLC has the capability to use Dyna-METRIC to compute BLSS requirements and can implement immediately.

4. Computing BLSS requirements to achieve a confidence level of 95 percent will provide support at least equal to today's computation at less cost.

5. The 47th Air Force Supply Executive has approved using Dyna-METRIC to compute BLSS requirements.

RECOMMENDATIONS

1. Implement Dyna-METRIC to compute BLSS requirements with an 95 percent confidence level and with a pipeline floor. (OPR: HQ AFLC/MMM)

2. Conduct a study to determine the impact of increasing the confidence level used to compute War Readiness Spares Kit (WRSK) requirements. (OPR: HQ AFLC/MMMA)

APPENDIX A

ESTIMATE OF AIR FORCE-WIDE BLSS REQUIREMENTS COST REDUCTION

APPENDIX A

ESTIMATE OF AIR FORCE-WIDE BLSS REQUIREMENTS COST REDUCTION

OVERVIEW

This Appendix describes how we estimated the expected reduction in BLSS costs from using Dyna-METRIC. First we show the reduction in computed requirements by comparing the current system (D029) to Dyna-METRIC at .80 and .95 confidence levels for selected weapon systems. We then apply the percentage of the reduction in cost to the entire range of BLSS for these weapon systems.

ANTICIPATED REDUCTION IN COST

Table A-1 compares the current system to Dyna-METRIC for the F-16, A-10, KC-135, F-111, and F-15. These five weapon systems represent the bulk of the Air Force's BLSS requirements cost. The costs shown are for computed requirements (non-computed are excluded). We apply these percent reductions in costs to the full range of BLSS for these weapon systems.

Comparison of Dyna-METRIC
to the Current System to
Compute BLSS Levels

Contingency Kits

Weapon System	PAA	Method	Confidence Level	Cost of Computed Items ($M)	Percent Reduction from Current System
F-16	24	Current System	.93	$20.62	---
OF016COR2470		Dyna-METRIC	.95	$12.61	38.8
		Dyna-METRIC	.81	$10.54	48.9
F-16	24	Current System	.93	$13.48	---
OF016AOR2470		Dyna-METRIC	.95	$ 9.95	26.2
		Dyna-METRIC	.80	$ 8.17	39.4
A-10	24	Current System	.67	$ 5.20	---
OA010AOR2470		Dyna-METRIC	.95	$ 4.75	8.6
		Dyna-METRIC	.80	$ 3.92	24.6
KC-135	15	Current System	.63	$ 7.96	---
KC135A051570		Dyna-METRIC	.95	$ 6.98	12.3
		Dyna-METRIC	.80	$ 5.96	25.1

Buy Kits

Weapon System	PAA	Method	Confidence Level	Cost of Computed Items ($M)	Percent Reduction from Current System
F-16	24	Current System	.91	$25.73	---
OF016COR248B		Dyna-METRIC	.95	$16.28	36.7
		Dyna-METRIC	.80	$13.56	47.3
F-16	48	Current System	.98	$37.69	---
OF016COD488B		Dyna-METRIC	.95	$23.10	38.7
		Dyna-METRIC	.88	$22.79	39.9
F-111	66	Current System	1.00	$134.24	---
OF111EOD6680		Dyna-METRIC	.95	$82.90	38.2
		Dyna-METRIC	.90	$82.40	38.6
F-15	24	Current System	.94	$35.24	---
OF015COD248W		Dyna-METRIC	.95	$16.03	52.2
		Dyna-METRIC	.90	$14.78	58.1

Table A-1

Before we could apply the percent reductions of Table A-1 to the full range of BLSS buy requirements, we needed to estimate what proportion of the BLSS costs is computed versus non-computed items. We wanted to be very conservative in our estimates of cost reductions. So, we were conservative in estimating what proportions of the BLSS are computed costs. We based our estimates on the data in Table A-2.

Percentage of BLSS Costs
Which are Computed Versus Negotiated

BLSS Kit		Total Cost ($M)	Computed Cost ($M)	Percent Computed
F-16	OF016COR2470	$25.73	$20.62	80%
	OF016AOR2470	$25.55	$13.48	53%
	OF016COR248B	$32.70	$25.73	79%
	F-16 Average			71%
A-10	OA010AOR2470	$11.45	$ 5.20	45%
KC-135	KC135A051570	$ 8.43	$ 7.69	13%
F-111	OF111EOD2480	$41.10	$36.80	90%
	OF111FOD6080	$82.90	$75.70	91%
	OF111GOD2480	$30.30	$22.60	75%
	F-111 Average			85%
EF-111	EF111AOD1283	$60.40	$39.00	65%
F-15	OF015COD248W	$78.15	$35.24	45%

Table A-2

We now apply the percentages from Table A-2 to the full range of BLSS to determine the costs of the computed items. We then apply the percent cost reductions achieved from using Dyna-METRIC (from Table A-1) to the Air Force-wide buy kit requirements BLSS costs for computed items by weapon system. We've rounded the percentages from Table A-1. Also, we've taken an average 34% cost reduction for the four F-16 kits in Table A-1, Table A-3 shows the results for Dyna-METRIC BLSS computed to a 95 percent confidence level. Table A-4 shows the results for Dyna-METRIC BLSS computed to an 80 percent confidence level.

Expected Reductions to
BLSS Buy Authorizations
(.95 Confidence)

Weapon System	Total BLSS Cost ($M)	Average % Computed (Table A-2)	Approx. Computed Cost ($M)	Dyna-METRIC % Reduction	Projected Cost Reduction
F-16	$149.93	71%	$106.00	34%	$36.00
A-10	$ 7.82	45%	$ 3.50	9%	$ .03
KC-135	$ 27.20	13%	$ 3.50	12%	$ .04
F-111	$134.92	85%	$115.00	38%	$43.70
F-15	$209.34	45%	$ 94.00	52%	$48.90
EF-111	$ 57.25	65%	$ 37.00	38%	$14.10
Total					$143.40

Table A-3

Expected Reductions to
BLSS Buy Authorizations
(.80 Confidence)

Weapon System	Total BLSS Cost ($M)	Average % Computed (Table A-2)	Approx. Computed Cost ($M)	Dyna-METRIC % Reduction	Projected Cost Reduction
F-16	$149.93	71%	$106.00	44%	$46.60
A-10	$ 7.82	45%	$ 3.50	25%	$ .90
KC-135	$ 27.20	13%	$ 3.50	25%	$ .90
F-111	$134.92	85%	$115.00	39%	$44.90
F-15	$209.34	45%	$ 94.00	58%	$54.50
EF-111	$ 57.25	65%	$ 37.00	39%	$14.40
Total					$162.20

Table A-4

We project a BLSS requirements cost reduction of $143.4 million if the Air Force computes BLSS to a 95 percent confidence level and $162.2 million for an 80 percent confidence level. Note requirements cost reductions do not necessarily mean cost savings. If the items are already bought and there is no offsetting requirements (i.e., in peacetime operating stocks), the result is spares in long supply, not a cost savings. Nonetheless, using Dyna-METRIC will result in a significant reduction in projected requirements.

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3. Pyles, Raymond, The Dyna-METRIC Readiness Assessment Model: Motivation, Capabilities and Use, Santa Monica, California: Rand, 1984.

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

31 MAY 1983

REPLY TO ATTN OF: MMM

SUBJECT: Final Report--Using Dyna-METRIC to Compute Base Level Self-Sufficiency Spares Requirements

TO: DISTRIBUTION LIST

1. The Air Force implemented Dyna-METRIC to compute War Readiness Spares Kit (WRSK) requirements, because Dyna-METRIC computes WRSK with equal or better combat capability at less cost than the previous computational method. Dyna-METRIC significantly reduced the requirements cost for remove, repair, and replace (RRR) WRSK. In this report (Attachment 2), we compare the current method to compute Base Level Self-Sufficiency Spares (BLSS) requirements to Dyna-METRIC computed BLSS. The current system computes a fixed safety level requirement. It is not scientific; it does not maximize weapon system performance nor even minimize back orders or cost. In addition, the current system does not consider indenture relationships nor cannibilizations. As a result, the current system stocks unnecessary items, too many of some items and too few of other items.

2. Since all BLSS use a RRR maintenance concept, we expected significant cost reduction from using Dyna-METRIC. We estimate Dyna-METRIC will reduce Air Force-wide BLSS requirements cost by $143.4 million and still meet the weapon system support objective. The Air Force uses an 80 percent confidence level to compute WRSK requirements, because 80 percent provided equal or better confidence than the previous computational method. However, the current system computed BLSS requirements generally achieve confidence levels higher than 80 percent. Therefore, we recommend the Air Force use a 95 percent confidence level to compute BLSS requirements. The higher confidence level assures support at least equal to the current BLSS at less cost. We intend to revisit the decision to use an 80 percent confidence level for WRSK. We provide all of our conclusions and recommendations in Attachment 1.

3. We briefed the results of our analysis to the 47th Air Force Supply Executive Board (AFSEB), and they approved using Dyna-METRIC to compute BLSS requirements. The Air Force Logistics Command is now using Dyna-METRIC to compute BLSS requirements.

4. Our point of contact is Lt Col D. Blazer, HQ AFLC/MMMA, AUTOVON 787-5244.

FOR THE COMMANDER

Marvin L. Davis
MARVIN L. DAVIS, Colonel, USAF
Director, Materiel Requirements
and Financial Management
DCS/Materiel Management

2 Atch
1. Conclusions and Recommendations
2. Final Report

UNITED STATES AIR FORCE
SEPTEMBER 18, 1947

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. The current method to compute Base Level Self-Sufficiency Spares (BLSS) is not scientific; it does not maximize combat capability, nor even minimize back orders or cost. The current system does not consider indenture relationships, and it does not relate to the Air Force method to assess a BLSS's war-fighting capability.

2. Dyna-METRIC computes leaner BLSS requirements; it reduces the Air Force-wide BLSS requirements cost by $143.4 million.

3. AFLC has the capability to use Dyna-METRIC to compute BLSS requirements and can implement immediately.

4. Computing BLSS requirements to achieve a confidence level of 95 percent will provide support at least equal to today's computation at less cost.

5. The 47th Air Force Supply Executive has approved using Dyna-METRIC to compute BLSS requirements.

RECOMMENDATIONS

1. Implement Dyna-METRIC to compute BLSS requirements with an 95 percent confidence level and with a pipeline floor. (OPR: HQ AFLC/MMM)

2. Conduct a study to determine the impact of increasing the confidence level used to compute War Readiness Spares Kit (WRSK) requirements. (OPR: HQ AFLC/MMMA)

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